Terry Hazen, Berkeley Lab: Deepwater Horizon Spill Detergents Could Make Bad Situation Worse

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With millions of gallons crude oil being spewed into the Gulf of Mexico from the Deepwater Horizon oil spill, the focus now is on shutting down the leak. However, in the cleanup efforts to come, “extreme caution” must be exercised so as not to make a bad situation even worse, says a leading bioremediation expert with the Lawrence Berkeley National Laboratory (Berkeley Lab).

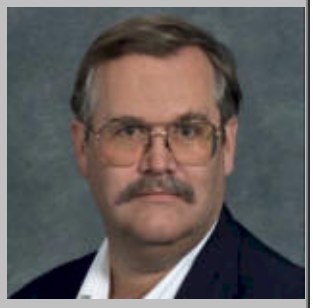
Extreme caution must be used in cleaning up the fragile Gulf Coast ecosystem in the aftermath of the Deepwater Horizon oil spill, says a Berkeley Lab bioremediation expert. Detergents used to clean up oil contaminated sites can make a bad situation even worse.

“The concentration of detergents and other chemicals used to clean up sites contaminated by oil spills can cause environmental nightmares of their own,” says Terry Hazen, a microbial ecologist in Berkeley Lab’s Earth Sciences Division who has studied such notorious oil-spill sites as the Exxon Valdez spill into Alaska’s Prince William Sound.

“It is important to remember that oil is a biological product and can be degraded by microbes, both on and beneath the surface of the water,” Hazen says. “Some of the detergents that are typically used to clean-up spill sites are more toxic than the oil itself, in which case it would be better to leave the site alone and allow microbes to do what they do best.”

The Deepwater Horizon oil rig leased by energy giant BP that exploded on April 20, is now estimated to be disgorging some 210,000 gallons of oil a day into the Gulf of Mexico. To contain the spreading oil slick and keep it from polluting the fragile ecosystems of the Gulf coast and the Mississippi delta, clean-up crews have deployed an array of chemical dispersants, oil skimmers

and booms. They have also attempted to burn off some of the surface oil. Such aggressive clean-up efforts are fraught with unintended consequences, Hazen warns. He cites as prime examples the Amoco Cadiz and the Exxon Valdez disasters.



Terry Hazen is a scientist with Berkeley Lab's Earth Sciences Division where he heads the Ecology Department and Center for Environmental Biotechnology, and co-directs the Virtual Institute for Microbial Stress and Survival.

In 1978, an oil tanker, the Amoco Cadiz, split in two about three miles off the coast of Normandy, releasing about 227,000 tons heavy crude oil that ultimately stained nearly 200 miles of coastline. The spill-site was so large that only the areas of greatest economic impact were treated with detergents. Large areas in the more remote parts of the coast went untreated.

"The untreated coastal areas were fully recovered within five years of the Amoco Cadiz spill," says Hazen. "As for the treated areas, ecological studies show that 30 years later, those areas still have not recovered."

In March of 1989, the oil supertanker Exxon Valdez spilled 11 million gallons of crude oil into the Prince William Sound and impacted some 1,300 miles of coastline. It remains the largest oil spill in U.S. history. A combination of detergents and bioremediation were used in the clean-up. The detergents were nutrient rich, being high in phosphorous and nitrogen compounds. In addition, as part of the bioremediation effort, fertilizers were also used to promote microbial growth. After the first year, the treated areas were dramatically cleaner, Hazen says, but after the second year no improvements were observed. Long-term prospects for the treated area are grim.

"What happened was that we took an oligotrophic (low nutrient) environment, and added lots of nutrients to it to speed up the degradation of the oil, which we probably did," Hazen says. "However, we upset the ecological balance of the system, which could not handle the influx of nutrients. As a result, the severe environmental damage resulting from the spill is expected to persist for decades to come."

While improvements to detergents have been made, including some degree of biodegradability, they remain nutrient rich and in some cases more toxic to the environment than crude oil.

"From a clean-up standpoint, right now we should be using sorbents to take up as much of the oil as possible," Hazen says. "Then we need to gauge how quickly and completely this oil can be degraded without human intervention."